IN THE CLAIMS

1. (currently amended) A method of identifying a presence of a first ~~material~~ fluid in an earth formation having a first transverse nuclear magnetic spin relaxation time T_2 in a mixture with a second ~~material~~ fluid in an earth formation having a second transverse nuclear magnetic spin relaxation time T_2' greater than said first transverse relaxation time, said first material comprising a small fraction of the mixture, the method comprising:

   (a) using a magnet to produce a static field in a region of examination in said earth formation and align nuclear spins in said region substantially parallel to a direction of said static field;

   (b) applying a pulse sequence

   A1 - τ- B1 τ - A2 - TW - A3

   where A1 is a first excitation pulse, τ is a Carr-Purcell time, B1 is a first refocusing pulse, A2 is forced inversion pulse, A3 is a second excitation pulse, and TW is a wait time, and

   (c) determining a value of TW for which a resulting signal from said second ~~material~~ fluid in said earth formation is substantially zero.

2. (previously presented) The method of claim 1 wherein said first excitation pulse comprises a pulse having a tip angle substantially equal to 90°.

3. (previously presented) The method of claim 1 wherein said second excitation pulse comprises a pulse having a tip angle substantially equal to 90°.

4. (previously presented) The method of claim 1 wherein said first refocusing pulse comprises a pulse having a tip angle substantially equal to 180°.

5. (previously presented) The method of claim 1 wherein determining said value of TW further comprises applying a sequence of refocusing pulses $B_{2\,i}$ after said second excitation pulse and determining a value of TW for which substantially no spin echo signals are produced by said sequence of refocusing pulses.

6. (previously presented) The method of claim 5 wherein at least one of said sequence of refocusing pulses comprises a pulse with a tip angle substantially equal to 180°.

7. (previously presented) The method of claim 1 further selecting τ to satisfy the condition

$$T_2' \gg \tau \gg T_2.$$

8. (previously presented) The method of claim 5 further comprising:

(i) repeating (b) with different values of TW until no free induction decay signal after the second excitation pulse A3 is produced;

(ii) repeating (b) with a value of TW altered from the value determined in (i); and

(iii) analyzing a resulting free induction decay signal.

9. **canceled**

10. (previously presented) The method of claim 9 further comprising conveying said magnet on a logging tool into a borehole into said earth formation.

11. (previously presented) The method of claim 10 wherein said logging tool is conveyed on a wireline.

12. (previously presented) The method of claim 10 wherein said logging tool is conveyed on a drilling tubular.

13. (previously presented) A system for identifying a presence of first fluid having a first transverse nuclear spin relaxation time T_2 in a mixture in an earth formation with a second fluid having a second transverse spin relaxation time T_2' greater than said first transverse relaxation time, said first fluid comprising a small fraction of the second fluid, the method comprising:

(a) a logging tool conveyed into a borehole into said earth formation,

(b) a magnet on said logging tool for producing a static field in a region of said earth formation including said mixture, said magnet aligning nuclear spins in said region substantially parallel to a direction of said static field;

(b) a transmitter on said logging tool for applying a radio frequency pulse sequence

$A1 - \tau - B1 - \tau - A2 - TW - A3$

to said mixture in said region, where A1 is a first excitation pulse, τ is a Carr-Purcell time, B1 is a first refocusing pulse , A2 is forced inversion pulse, and A3 is a second excitation pulse,

(c) a receiver on said logging tool for receiving signals resulting from said nuclear spins resulting from application of said pulse sequence; and

(d) a processor for determining a value of TW for which a resulting signal from said second fluid is substantially zero.

14. (previously presented) The system of claim 13 wherein said first excitation pulse comprises a pulse having a tip angle substantially equal to 90°.

15. (previously presented) The system of claim 13 wherein said second excitation pulse comprises a pulse having a tip angle substantially equal to 90°

16. (previously presented) The system of claim 13 wherein determining said value of TW further comprises applying a sequence of refocusing pulses B_{2i} after said second excitation pulse and determining a value of TW for which substantially no spin echo signals are produced by said sequence of refocusing pules

17. (previously presented) The system of claim 13 wherein said first refocusing pulse comprises a pulse having a tip angle substantially equal to 180°.

18. (previously presented) The system of claim 16 wherein at least one of said sequence of refocusing pulses comprises a pulse with a tip angle substantially equal to 180°.

19. (previously presented) The system of claim 13 wherein $T_2' >> \tau >> T_2$.

20. (previously presented) The system of claim 13 wherein said processor further performs:

(i) a repetition of (b) in claim 13 with different values of TW until no free induction decay signal after the second excitation pulse A3 is produced;

(ii) a repetition of (b) in claim 13 with the value of TW altered from the value determined in (i) ; and

(iii) analyzes a resulting free induction decay signal.

21. (previously presented) The system of claim 13 further comprising a wireline for conveying said logging tool into said borehole.

22. (previously presented) The system of claim 13 further comprising a drilling tubular for conveying said logging tool into said borehole.

23. (previously presented) The system of claim 13 wherein said processor is on said logging tool.